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Clinical Meeting & Exhibition

A Straight Shot: Update on Adult Vaccination Recommendations

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Disclosure

The program chair and presenters for this continuing education activity have reported no relevant financial relationships, except:

- **Christopher McCoy** - Allergan: Board Member/Advisory Panel; The Medicines Company: Board Member/Advisory Panel; Theravance Biopharma: Board Member/Advisory Panel; Zavante: Grant/Research Support

Objectives

At the conclusion of the lecture, the audience should be able to:

- Discuss the latest updates in vaccine recommendations from the Advisory Committee on Immunization Practices (ACIP) and/or the Center for Diseases Control (CDC) for select adult infections.

- Evaluate the literature supporting the changes in vaccine selection recommendations for adults.

- Given a patient scenario, determine the appropriate vaccine from the newer products available.

Quick Epidemiologic Facts

- **Pneumococcal disease :**
  - 29,100 cases 2014 – 3,250 deaths
  - Peak ages are over 50 years and ≤ 1 year
- **Influenza:**
  - 625K influenza like illness patient care visits 2015-16
  - Lower rates compared to the previous 2 seasons, peaked in Spring
  - Predominant strain A (H1N1)
  - Average number of hospitalizations (2014)= 226,000 annually
  - >60% in adults over 24 years

CDC. Active Bacterial Core Surveillance 2014
CDC. FluView 2015-2016, Accessed 9/1/16

Quick Epidemiologic Facts

- **Meningococcus :**
  - >14,000 cases annually 2013 – 2014
  - Incidence historically low however overall case-fatality rate 10%-15%, long term sequelae in 10-20%
  - >64% in adults
  - Outbreaks: 2016 in NJ, 2015 SoCal and Chicago
- **Varicella Zoster Virus (adult):**
  - 1 million cases annually
  - Lifetime risk is 30%: Risk increases with age over 50
  - Reactivation event in adults (aka Shingles)

CDC. MMWR 2013. 61: 719 – 32.
CDC. MMWR 2008. 57: 1-30.

Process for Updating Vaccine Recommendations

- Annual meeting February, ACIP and CDC data review
  - Unpublished data provided by vaccine manufacturer
  - Published data and data from scientific meetings
  - Published epidemiologic data

- Important review topics
  - Immunogenicity including antibody kinetics
  - Efficacy in preventing disease and durability of response
  - Post-marketing dose selection
  - Comparative schedules for effectiveness
  - Response in special populations
  - Outbreak data and adverse events

2016 Vaccine Updates

- Interval change for pneumococcal vaccine
  - 13-valent pneumococcal conjugate vaccine (PCV13) followed by 23-valent pneumococcal polysaccharide vaccine (PPSV23)
    - From "**6 to 12 months**" to "**at least 1 year**" adults aged ≥65

- Expand receipt of serogroup B meningococcal (MenB) to persons ≥10 years at high risk

- Nine-valent human papillomavirus (HPV) vaccine (9vHPV) added as preferred

MMWR 2015;64[34]:944–947;
MMWR 2015;64[22]:608–612;
MMWR 2015;64[11]:300–304

2016 Influenza Updates

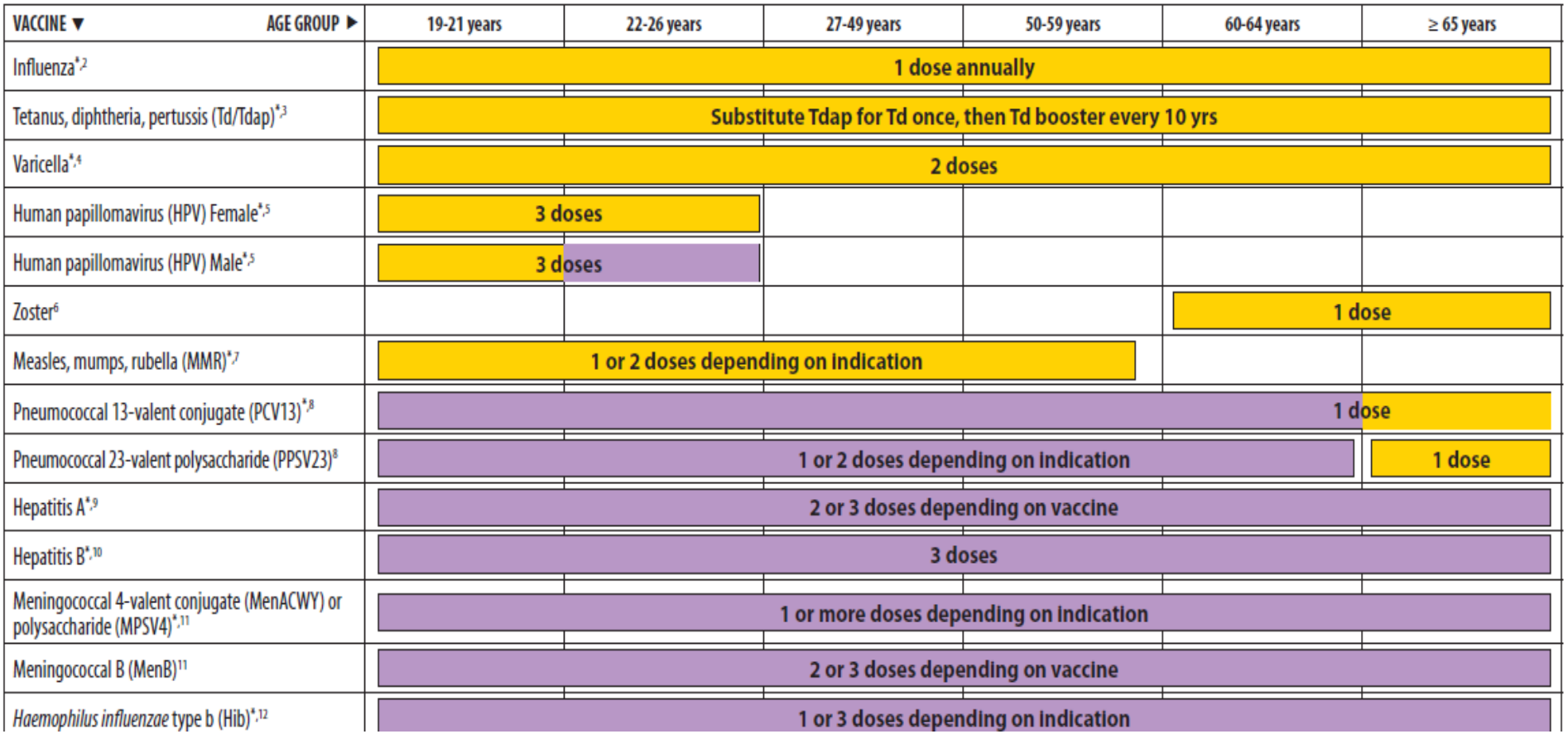
- Live Activated Influenza Vaccine (LAIV4) should not be used
- Inactivated trivalent (IIV3) and quadrivalent (IIV4) are equivalent, no studies of comparative effectiveness
- Multiple brands of IIV3 and IIV4 are available, no preference
- Opting out due to egg allergy restricted, administer egg free for severe hx, recombinant (RIV3: Flublok®), observe all others

Grohskopf *MMWR* 2016;65:1–54

Recommended Adult Immunization Schedule—United States - 2016

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

Figure 1. Recommended immunization schedule for adults aged 19 years or older, by vaccine and age group[1]



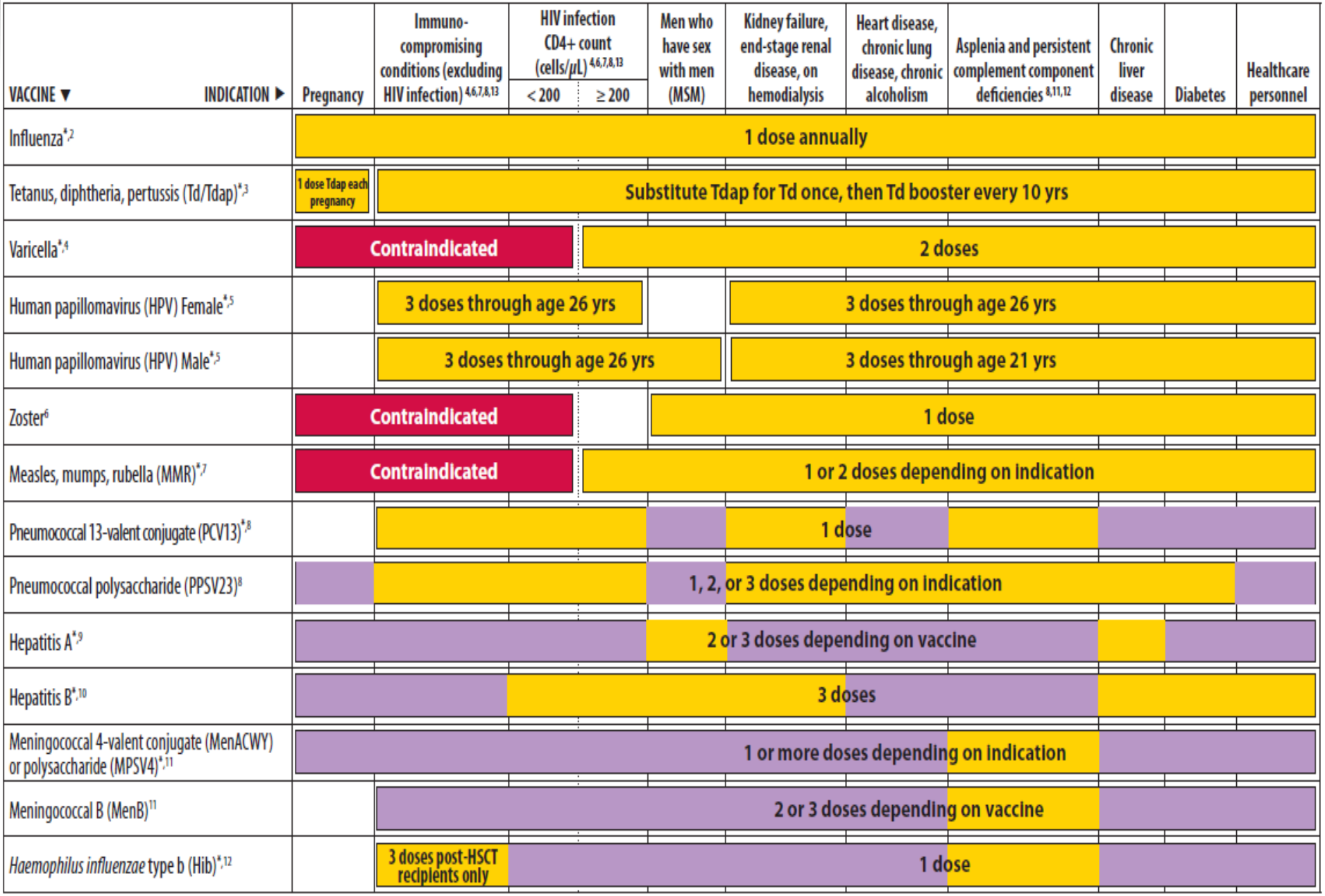
*Covered by the Vaccine Injury Compensation Program

Recommended for all persons who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; zoster vaccine is recommended regardless of past episode of zoster

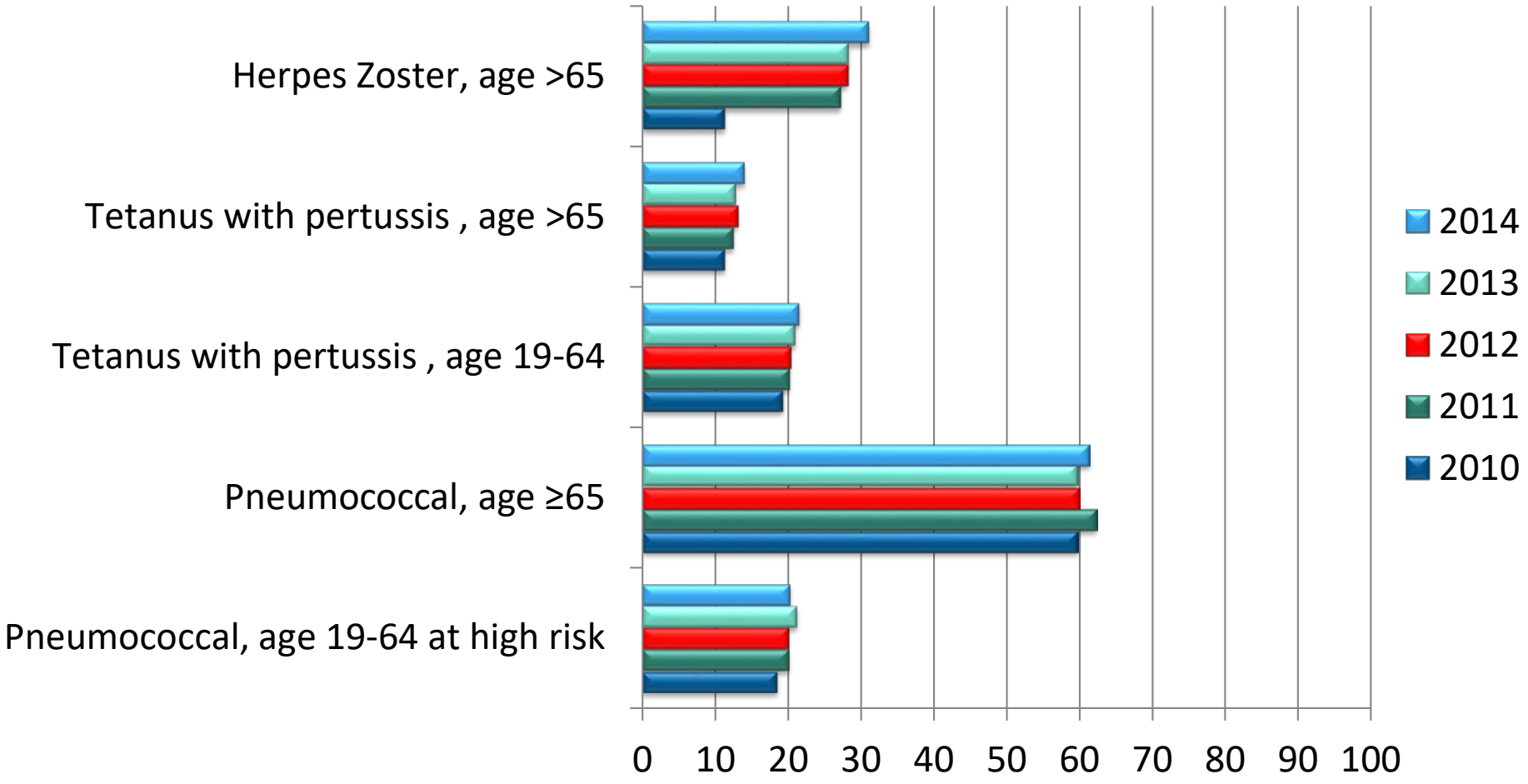
Recommended for persons with a risk factor (medical, occupational, lifestyle, or other indication)

No recommendation

Figure 2. Vaccines that might be indicated for adults aged 19 years or older based on medical and other indications[1]



Immunization Rates Among Adults



CDC *MMWR* 2016; 65 ; 1: 34-49

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Immunization Rates: Influenza

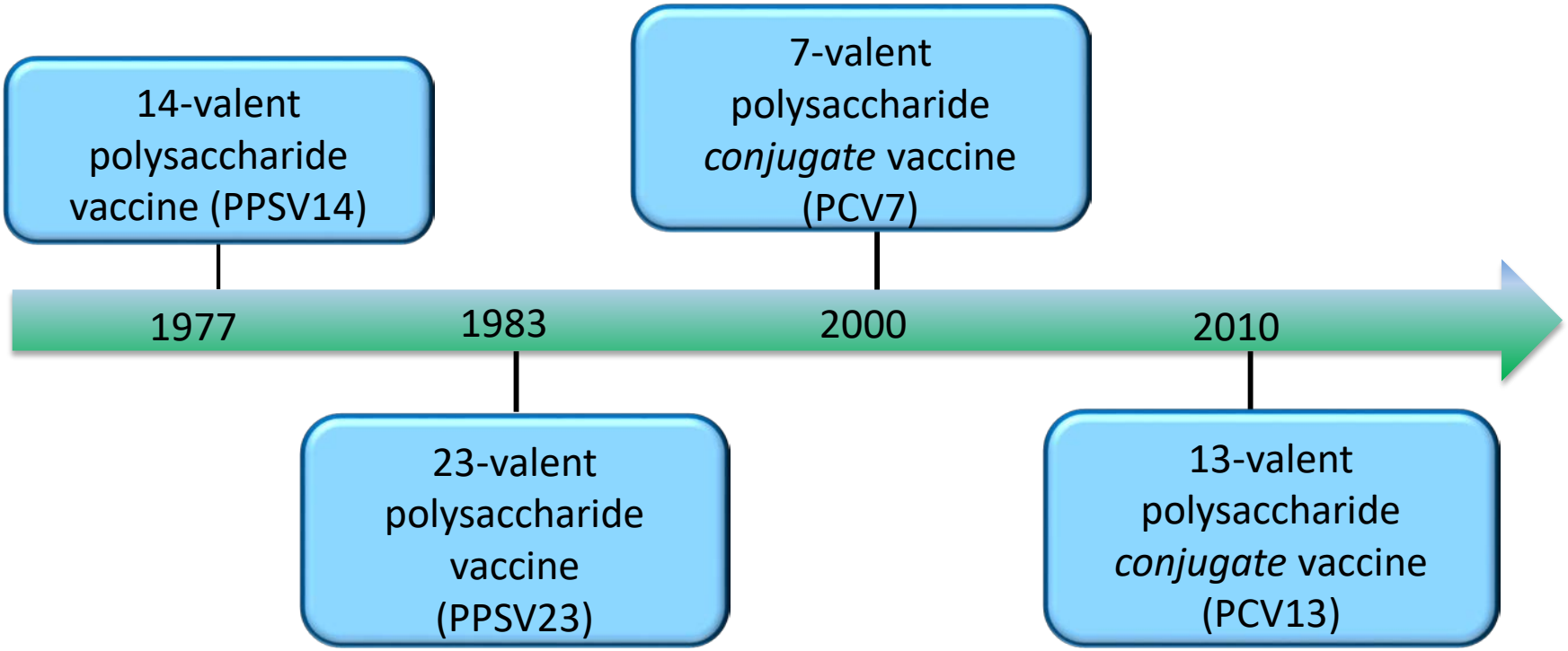
Group	2011-12 (%)	2012-13 (%)	2013-14 (%)	2014-15 (%)
Persons ≥ 18 yrs	38.8	41.5	42.2	43.6
Persons 18-49 yrs, all	28.6	31.1	32.3	33.5
Persons 18-49 yrs, high risk	36.8	39.8	38.7	39.3
Persons 50-64 yrs	42.7	45.1	45.3	47.0
Persons ≥ 65 yrs	64.9	66.2	65.0	66.7
Health Care Workers	62.4	62.5	62.9	64.3

Healthy People 2020 target = 70%

CDC. National Flu Survey, MMWR 62 ;1-29
CDC: MMWR 2016 ; 65 :10-12

Pneumococcal Vaccine

Pneumococcal Vaccine Timeline



PPSV23 vs. PCV13

	PPSV23	PCV13
Induction of antibody response	T cell-independent (infants unable to process)	T cell-dependent (infant compatible)
Serotype titer response	Lower Ab titer Shorter memory time	Increase in Ab titer (4x) greater with improved memory
Serotypes covered	1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F, 2, 8, 9N, 10A, 11A, 12F, 15B, 17F, 20, 22F, 33F	1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F
Protection in infants/ elderly	Poor response	Good response

CDC: MMWR 2010;59:258-61

PPSV23 vs. PCV13

Adults 65y or older **PPSV23 and PCV13**	Adults 19- 64y **PPSV23 only**	Adults 19- 64y **PPSV23 and PCV13**
Administer dose of **PCV13** first WAIT 1 YEAR Administer dose PPSV23	Chronic conditions: o Asthma o Diabetes o Heart disease o Alcoholism o Liver disease Habits/Environment o Cigarette smoking o Nursing home or long term care facility dweller Vaccinate every **5 years** until 65 years	o Functional or anatomic asplenia o Cochlear implants o Cerebrospinal fluid leaks o Lymphoma, Leukemia, Hodgkin's disease o Solid organ transplant o HIV infection o Chronic renal failure o Nephrotic syndrome o Long term immunosuppressive therapy o Multiple myeloma Vaccinate PPSV23 every **5 years** until 65 years Wait **1 year** if PCV13 given prior
If you accidentally give **PPSV23** first WAIT 1 YEAR Administer dose PCV13		

CDC/ACIP MMWR: 2015 64(34);944-47

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PCV13 in Adults

Community-Acquired Pneumonia Immunization Trial in Adults (CAPITA)	
Objective	To evaluate PCV13 for the prevention of vaccine-type invasive and noninvasive CAP in adults ≥65 years
Inclusion Criteria	• Netherlands • September 08 –January 10
Design and Enrollment	• N=84,492 randomized to PCV13 or placebo 1:1 • Followed for incidence of invasive pneumococcal disease (IPD) or pneumonia
Results	• Efficacy (decrease) in vaccine-type invasive pneumococcal disease (IPD) 75.0% (CI 41.4 to 90.8) p<0.001 • Efficacy (decrease) in vaccine-type non-bacteremic pneumonia: 45.0% (CI 14.2 to 65.3) p<0.007

Bonten MJM, et al. *N Engl J Med.* 2015;372:1114-1125.

Case 1

MA is a 56-year-old female admitted to your hospital for a urinary tract infection with a past medical history of T2DM for 7 years. When asked about her vaccination status, MA reports that she has not received any vaccinations for several years. When viewing the medical record, the pneumococcal vaccine sheet is blank.

Based on her history, which vaccine should she receive as an inpatient, after her fever abates and she is clinically stable?

- A Neither vaccine as she is under 65 years
- B PCV13 today, followed by PPSV23 in 6-12 months
- C PCV13 only
- D PPSV23 only

Case 1

MA is a 56-year-old female admitted to your hospital for a urinary tract infection with a past medical history of T2DM for 7 years. When asked about her vaccination status, MA reports that she has not received any vaccinations for several years. When viewing the medical record, the pneumococcal vaccine sheet is blank.

Based on her history, which vaccine should she receive as an inpatient, after her fever abates and she is clinically stable?

- A Neither vaccine as she is under 65 years
- B PCV13 today, followed by PPSV23 in 6-12 months
- C PCV13 only
- D PPSV23 only

Influenza Vaccine

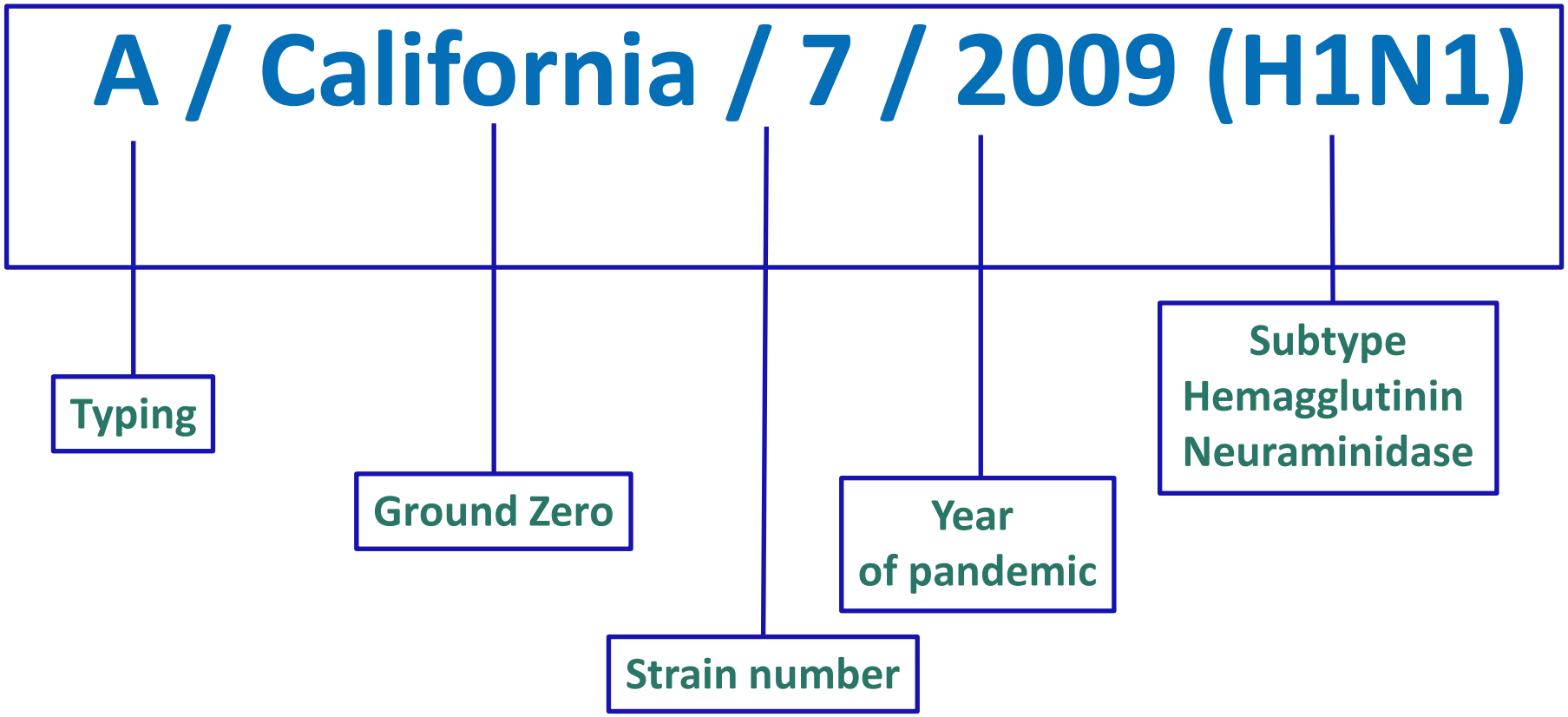
Selected Strains: 2016-17

- Trivalent vaccines containing:
  - *A/California/7/2009 (H1N1)*
  - *A/Hong Kong/4801/2014 (H3N2)*
  - *B/Brisbane/60/2008 (Victoria lineage)*

- Quadrivalent vaccines containing additional
  - *B/Phuket/3073/2013 (Yamagata lineage)*

CDC: MMWR: 2016 65(5);1–54

Name that Viral Strain

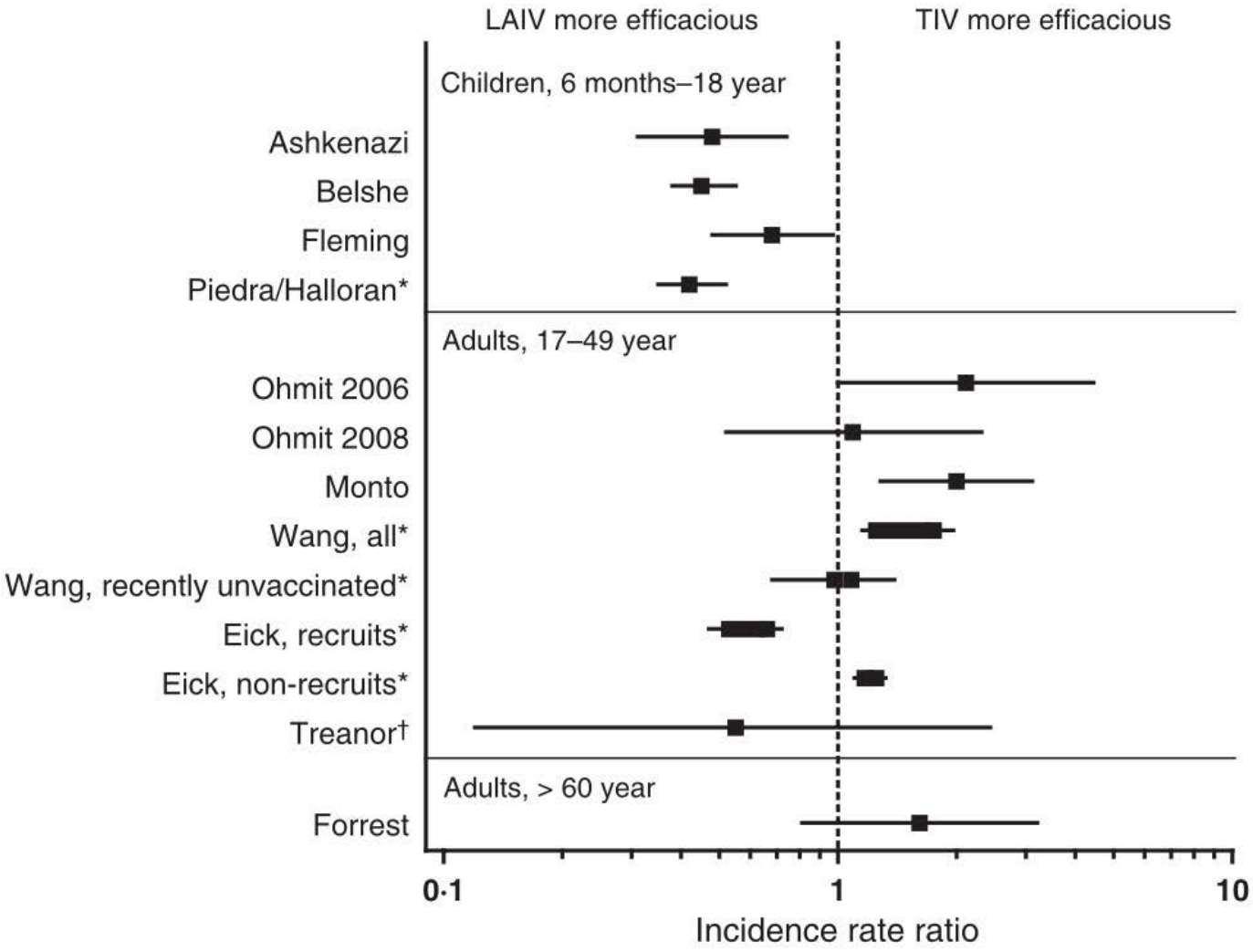


TIV vs. LAIV

	TIV (Trivalent Inactivated Vaccine)	LAIV (Live Attenuated Influenza Vaccine)
Indicated population	> 6 months	2-49 years of age
Content of vaccine	Trivalent (15 µg of each strain)	Trivalent (15 µg of each strain)
Production	Chicken egg except FLUBLOK™	Chicken egg
Virus state	Inactivated	Cold-adapted
Route of administration	Intramuscular	Intranasal
Contraindication	Severe allergy to vaccine or vaccine components, history of Guillian Barre Syndrome (GBS), acute illness	Immunocompromise, children < 5 and history of recurrent wheezing, children/adolescents receiving ASA, pregnancy, severe egg allergy, GBS

CDC: MMWR: 2016 65(5);1–54

TIV vs. LAIV –Metaanalysis



Ambrose et al. *Influenza and Other Respiratory Viruses*, 2010: 5, 67–7

TIV vs. LAIV

Comparative Trial for Prevention of Influenza	
Objective	To evaluate whether vaccinating children and adolescents with LAIV provides better community protection than IIV
Inclusion Criteria	ages 36 mo-15 years: Canada October 2012 and May 2015 over 3 flu seasons
Design and Enrollment	N=4611 randomized to LAIV or TIV randomized by colony cluster randomized blinded trial
Outcome measured	Confirmed influenza A or B virus infection
Results	Hazard ratio comparing LAIV with IIV for influenza A or B virus was 1.03 (95% CI, 0.85 to 1.24)

Loeb M. *Ann Intern Med. 2016*

TIV vs. LAIV

US Flu Vaccine Effectiveness	
Objective	To evaluate the effectiveness of LAIV vs. IIV in children and adolescents during the 2015-16 season
Inclusion Criteria	Nov 2, 2015–Apr 15, 2016 Children 2-17 years of age with confirmed flu
Design and Enrollment	N=2286 observational trial
Outcome measured	Confirmed influenza A or B virus infection
Results	LAIV higher OR for confirmed infection 2.63 (95% CI, 2.59-4.37)

Flannery B, MMWR 2016;64;10-15

Influenza Vaccines 2016-17

	[redacted]	IIV3 Standard dose (Trivalent)	IIV3 High dose (Trivalent)	IIV4 (Quadrivalent)
Approved Age		>6 months	**>65 years**	>3 years
For individuals with risk factors for influenza-related complications?		Yes	Yes	Yes
Route		IM/Intradermal	IM	IM
Dose		0.5ml/0.1ml (9 mcg each strain)	0.5ml (60 mcg each strain)	0.5ml (9 mcg each strain)
Contain Thimerosal?		Product dependent	No	Product dependent
Egg derived		Not all (Flublok™)	Yes	Yes

High Dose –Effectiveness

Comparative Effectiveness of High-Dose versus Standard Dose Influenza Vaccines in US Residents	
Objective	To establish whether high-dose (60mcg) vaccine was more effective for prevention of influenza-related visits and hospital admissions vs standard dose
Inclusion Criteria	US Medicare beneficiaries 2012-13 Medically stable persons ≥65 years of age living in the community
Design and Enrollment	N=2,545,275 observational trial retrospective cohort Data from billing codes
Outcome measured	Positive influenza test followed by neuraminidase prescription Hospital or Emergency Department visits coded for influenza
Results	High dose was associated with 22% (95% CI 15–29) fewer positive influenza tests requiring treatment and 22% (95% CI 16–27%) fewer hospital or Emergency Department visits

Hector S Izurieta. Et. al. Lancet Inf Diseases 2015 (14) S1473-3099

ACIP Recommendations –Influenza

- Everyone annually –aged 6 months or older
- Special effort to vaccinate patients at increased risk of complications and their close contacts:
  - Immunocompromised
  - Medical comorbidities including: Asthma/ COPD/ Diabetes/ Cardiovascular Disease/CKD
  - Age greater than 65 years or under 2 years
  - Pregnant women
  - Healthcare workers

Grohskopf LA, et al. MMWR; 2016;65:1-53.

Case 2

WH is a 69 year old female with asthma. Of the following flu vaccines, which is the preferred influenza vaccine for this patient?

A. IIV3, Standard Dose
B. IIV4, Standard Dose
C. IIV3, High Dose
D. LAIV3, Standard Dose
E. A, B, or C

Case 2

WH is a 69 year old female with asthma. Of the following flu vaccines, which is the preferred influenza vaccine for this patient?

A. IIV3, Standard Dose
B. IIV4, Standard Dose
C. IIV3, High Dose
D. LAIV3, Standard Dose
E. A, B, or C

Meningococcal Vaccines

N. meningitidis Serogroups

Serogroup: Polysaccharide capsule	Characteristics
A	- Leading cause of epidemic meningitis worldwide - Most prevalent in Africa and China
B	- Europe and Americas, not previously covered by vaccine - Recent highly publicized outbreaks
C	- Europe and North America - Multiple outbreaks
Y	- Unusual presentation, pneumonia - Increasing prevalence in the US, affecting all age groups
W-135	- Infrequent and unusual infection: arthritis-pericarditis - Younger age groups with high case fatality rate

Harrison OB, et al. Emerg Infect Dis 2013;19:566–73.

Meningococcal ACWY Vaccines

Vaccine	Type	Approved age range
Menomune™ (MPSV4)	Polysaccharide	≥2 years (single dose) 2 doses asplenia/HIV/comp def
Menactra™ (MenACWY-D)	Conjugate	9 to 23 mos. (2-dose series) 2 to 55 years (single dose) 2 doses asplenia/HIV/comp def
Menveo™ (MenACWY-CRM)	Conjugate	9 to 23 mos. (2-dose series) 2 to 55 years (single dose) 2 doses asplenia/HIV/comp def

Cohn et.al. MMWR 2013;62(2):10-11

Meningococcal B Vaccines

Vaccine	Type	Approved age range
Trumenba™ (MenB-FHbp)	Factor H Binding Protein Bivalent recombinant lipoprotein	10-25 years at increased risk (3 dose series)
Bexsero™ (MenB-4C)	(Neisserial adhesion A [NadA], factor H binding protein [FHbp] fusion protein, and neisserial heparin binding antigen [NHBA] fusion protein)	10-25 years at increased risk (2 dose series)

Cohn et.al. MMWR 2013;62(2):10-11

ACWY Vaccine Shortages

- Both Menveo and Menactra have been intermittently in shortage
- Many providers have been caught in a position of giving immunization with Menveo or Menactra, to be told that the vaccine wasn't available for their next patient or follow up dose
- In 2006, CDC recommended that Menactra (MCV4) be preferentially given to patients at highest risk and that young children getting their last booster receive Menomune (MPSV4)

Cohn et.al. MMWR 2013;62(2):10-11
CDC.MMWR 2006;55:567-8.

ACIP Recommendations – ACWY vaccine

- ACIP recommends vaccine for patients aged ≥2 months at increased risk and for all adolescents aged 11-18 years
- **2 doses** of MenACWY ≥2 months apart to 1.) adults with functional asplenia or 2.) persistent complement deficiencies and HIV-infected persons of any age
- **Single dose**:
  - First-year college students aged ≤ 21 years living in residence halls if they have not received dose on or after 16th birthday
  - Microbiologists exposed to *Neisseria meningitidis*
  - Persons at risk during outbreak from a vaccine serogroup
  - Persons who travel to/live in countries where meningococcal disease is hyperendemic or epidemic

Cohn et.al. MMWR 2013;62(2):10-11

Meningococcal Outbreaks

- Generally rare, historic low (0.2/100K) with vaccines, but occurrences are highly publicized
- Serogroup B meningococcal disease clusters/outbreaks on college campuses
  - Princeton: 1400 fold increase; 7,500 administered vaccine
  - UCSB: 200 fold increase; 20,000 administered vaccine
- Surveillance in HIV positive: 10x the incidence in NYC 2000-2011
- Threshold for vaccination for serogroup B outbreaks in institutional settings
  - 2 cases in population <5,000 persons
  - 3 cases in population ≥5,000 persons

CDC. MMWR 2012;61:217–21.
Miller L, et al. Ann Intern Med. 2014; 160:30-38

Newer MenB Vaccines

- Accelerated approval in the US based on pre-published data for safety and immunogenicity

	Bexsero (MenB-4C)	Trumenba (MenB-FHbp)
Doses (interval)	2 (0, 6 months)	3 (0, 2, 6 months)
No. of patients	N= 1509 active/ 498 control	N= 1982 active/ 501 control
Patient age	11-18 yr	11-18 yr
Concomitant vaccine	No studies	4vHPV, MenACWY, Tdap and Tdap/IPV
Immunogenicity	88% (CI = 82%–93%)	80% (CI = 82%–84%)
Long term immunity	24 month: 25% waning	48 month: 30% waning

Richmond PC, et al. Lancet Infect Dis 2012;12: 597–607.
Perrett KP, et al. Vaccine 2015;33:5217–24.

ACIP 2016 Recommendations

- Serogroup B meningococcal vaccine series should be administered to persons aged ≥10 years at increased risk for meningococcal disease
  - Persistent complement deficiency
  - Anatomic or functional asplenia
  - Risk in a serogroup B meningococcal disease outbreak
  - Certain microbiologists
  - Persons receiving eculizumab (Soliris®)

- Continuing discussions about the potential for broader immunization in HIV positive patients

MacNeil, JR. MMWR / 2015 , Vol. 64 ; (41) 1171-76

Case 3

FT a 53yo M s/p splenectomy after trauma arriving to clinic for vaccinations against capsular organisms. Which meningococcal serotype vaccine is most appropriate?

A. Serotype B
B. Serotypes ACWY
C. None – only for HIV positive patients
D. Both A and B

Case 3

FT a 53yo M s/p splenectomy after trauma arriving to clinic for vaccinations against capsular organisms. Which meningococcal serotype vaccine is most appropriate?

A. Serotype B
B. Serotypes ACWY
C. None – only for HIV positive patients
D. Both A and B

Pertussis Vaccine

Epidemiology

Bordetella Pertussis associated with respiratory illness (Whooping Cough) affecting up to 200,000 per year in the early 20th century

- 1940's: Whole cell vaccine introduced
- 1970's: Pertussis cases reported to CDC fall to an all time low in the US:1000 cases
- 1990's: Acellular Pertussis vaccine replaces whole cell vaccine
- 2004: Pertussis rates rise to an all time high of ~26,000 cases
- 2005: Booster vaccine (Tdap) introduced for adults and children to make up for waning immunity and vaccine refusal

Phadke, VK. et.al. *JAMA*. 2016;315(11):1149-1158.

Outbreak Analysis

- California epidemic 2010
  - 9,154 cases, 52% of cases were adults exposed to sick children
- Full recognition of the limitations of DTaP and Tdap in terms of long term immunity recognized
- 2011: ACIP expands booster recommendations: Pregnant women and adults
- In 2015, 18,166 cases in the US, 22.2% in patients over age 19
  - Subset of patients 6 mo - 6 yrs with available immunization data
    - o 45% unknown or unvaccinated
    - o 49% are fully immunized

Winter K et al. *J Pediatr*. 2012; 161(6):1091-1096.
Tartof SY, et al..*Pediatrics*. 2013;131(4):e1047-e1052
CDC. MMWR 2016; 64(52) 1-2.

ACIP Recommendations

Age of patient/ vaccine status	Recommendation
6 weeks to 6 yrs	Use DTaP to complete the primary series
7 to 10 yrs not fully vaccinated against pertussis	One dose of Tdap
11-64 yrs No record of TdaP	One dose of Tdap, then one dose of Td every 10 years
>65 yrs No record of TdaP	One dose of Tdap, then one dose of Td every 10 years
Population/vaccine status	**Recommendation**
Health Care Providers No record of TdaP	One dose of Tdap
Pregnant women	One dose of Tdap at 27-36 wks

CDC: Immunization schedule. ACIP, 2016.

Tdap in Pregnancy

- Pregnant women due for tetanus booster:
  - >10 years since previous Td ➡ Tdap one dose
- Wound management for pregnant women:
  - If ≥5 years since the previous Td booster ➡ Tdap one dose
- Pregnant women (all):
  - Tdap should be administered for all pregnancies between 27 to 36 wks

CDC. 2012. MMWR Morb Mortal Wkly Rep 2013;62:131–5.

Pertussis Vaccines

Excluding the combination agents with polio, hepatitis, *H. influenzae*, etc.

Vaccine	Brand(s)	Approved age range/doses
Diphtheria & Tetanus Toxoids & Acellular Pertussis (DTaP)	Tripedia™ Infanrix™ Daptacel™	≥2 mo - 6 yrs (5 doses) 1) 2 months 2) 4 months 3) 6 months 4) 15 - 18 months 5) 4 - 6 years
Tetanus, Diphtheria and Acellular Pertussis (Tdap)	Adacel™ Boostrix™	7 yrs to late adulthood (single dose)

Case 4

DM, a 37 yo F who is 7 months pregnant, arrives at clinic for her influenza vaccine. She received the Tdap vaccine prior to her previous pregnancy 3 years ago. According to current recommendations, should she receive the Tdap vaccine?

- A Yes, Tdap should be administered irrespective of prior history
- B No, Tdap is contraindicated during pregnancy
- C No, it's too late in her pregnancy (>4 months)
- D No, Tdap is a once per lifetime dose as an adult

Case 4

DM, a 37 yo F who is 7 months pregnant, arrives at clinic for her influenza vaccine. She received the Tdap vaccine prior to her previous pregnancy 3 years ago. According to current recommendations, should she receive the Tdap vaccine?

A. Yes, Tdap should be administered irrespective of prior history
B. No, Tdap is contraindicated during pregnancy
C. No, it's too late in her pregnancy (>4 months)
D. No, Tdap is a once per lifetime dose as an adult

Varicella Zoster

Epidemiology Varicella

- Reactivation of latent virus in immunocompromised adults (any age) or immunocompetent adults (over age 50)
- Manifestation as a dermatomal vesicular rash primarily but can cause more invasive disease
- If non-invasive, most serious complication is painful post-herpetic neuralgia (PHN)
- Incidence: 2 to 4.6 per 1000 person years but increases to 10 to 12.8 at age 80 years

Cohen JI. N Engl J Med 2013; 369: 255-63.
Johnson BH, et.al. BMC Infect Dis 2015;15: 502.

ACIP Recommendations –Zoster

- 2006: vaccinate adults > 60 years
- 2011: vaccinate adults > 50 years
  - Drug shortages ensued, waning immunity at older ages
- Updated recommendation to adults >60 years again
- Not recommended for immunocompromised patients, high potency live vaccine
  - Exceptions, patients with well controlled HIV, patients about to undergo chemotherapy, patients about to receive immunomodulatory therapy

Hales CM et.al. MMWR 2014; 63; 33: 729-31.

Varicella Vaccines

Brand(s)	Type	Potency	Indication	Approved age range	Contraindications
Zostavax™	Live Attenuated	19,400 PFU	Prevention of reactivation	≥50 years* (single dose) Recommended over age 60	allergy to vaccine, immuno-compromise**, pregnancy
Varivax™ Proquad™	Inactivated	1,350 PFU	Prevention of primary infection	1: 12 - 15 months 2: 4 through 6 yrs (2 doses)***	allergy to vaccine, acute infection, pregnancy.

PFU=plague forming unit

*can consider for younger patients with chronic renal failure, diabetes mellitus, rheumatoid arthritis, and chronic pulmonary disease

**immunocompromise definition: HIV CD4<200, cancer on chemotherapy, transplant or other requiring immunosuppressants, high dose prolonged steroids

***can also immunize after age 13 if patient has never had chicken pox or immunization

Zostavax –Efficacy

Shingles Prevention Study: Prevention of Infection and Post-Herpetic Neuralgia (PHN) in Older Adults	
Objective	To compare the incidence of zoster and PHN in a high risk older population vaccinated with active vaccine versus placebo
Inclusion Criteria	healthy adults aged ≥60 years who had a history of varicella or at least 30 years of residence in the US
Design and Enrollment	Phase 3: double-blind randomized, placebo-controlled trial N=38,456, 3 year observation period post injection
Outcome measured	Confirmed zoster infection by PCR or viral culture, if positive, severity of infection and incidence of PHN for 182 days after infection
Results	Reduction in risk for developing zoster by 51.3% vaccine vs. placebo (95% CI = 44.2–57.6; p<0.001) Reduction in rate of PHN by 66.5% vaccine vs. placebo (95% CI = 47.5–79.2; p<0.001)

Oxman MN, et al. N Engl J Med 2005;352:2271-84

Case 5

It’s November and LB is a 56-year-old male admitted to the hospital for pneumonia, he has a past medical history of chronic renal failure for 7 years. When asked about his vaccination status, LB reports that he has not received any vaccination for several years.

Case 5

Based on his history, which vaccine should he receive as an inpatient, after fever has subsided and he is clinically stable?

A. Inactivated quadrivalent influenza vaccine
B. PCV13 today, followed by PPSV23 12 months later
C. Zostavax
D. Meningococcal B vaccine
E. A and B

Case 5

Based on his history, which vaccine should he receive as an inpatient, after fever has subsided and he is clinically stable?

A. Inactivated quadrivalent influenza vaccine
B. PCV13 today, followed by PPSV23 12 months later
C. Zostavax
D. Meningococcal B vaccine
E. A and B

ISMP –Top Three Vaccine Errors

- Inappropriate schedule –Wrong age, wrong timing between doses
- Storage errors –Expired vaccine administered, incorrect storage of vaccine
- Wrong vaccine administered

Common Wrong Vaccine Mix-ups
Varicella primary vaccine vs. Herpes-zoster "booster"
Diphtheria, tetanus and pertussis (DTaP) vs. Tetanus, diphtheria and pertussis (Tdap)
Pneumococcal conjugate vs Pneumococcal polysaccharide
Hepatitis A vs. Hepatitis B

CDC. Immunization Safety Office. May 2015

Key Takeaways

- Key Takeaway #1
  - Have handy references available, alphabet soup can get confusing for all: MenHBFp, DTaP, Tdap, MenCV
- Key Takeaway #2
  - Review the ACIP recommendations annually (Feb) and keep schedule handy to include exempt patients
- Key Takeaway #3
  - Help identify patients at risk and work towards more universal immunization